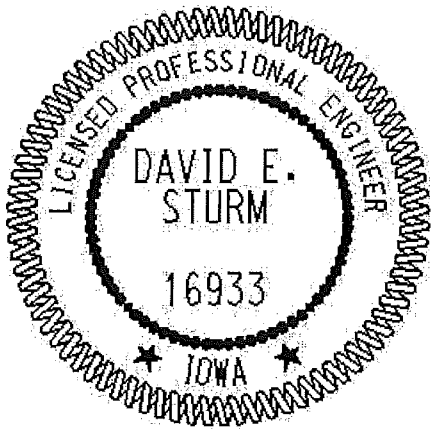


**PRELIMINARY ENGINEERING REVIEW  
STORMWATER IMPROVEMENTS  
DEFIANCE, IOWA**

**JULY, 2007**



I hereby certify that this Engineering Document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the Laws of the State of Iowa.

*David E. Sturm*

*7-5-07*

David E. Sturm, P.E.

Date

License Number 16933

My License Renewal Date is December 31, 2007

Pages or sheets covered by this seal:

*ALL*

Prepared by:

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**STORMWATER IMPROVEMENTS  
DEFIANCE, IOWA  
JULY, 2007**

**PRELIMINARY ENGINEERING REPORT**

**Narrative**

The storm water drainage systems in Defiance direct storm water flow from north to south. Drainage in the area of Defiance bounded on the south by Main Avenue, on the east by Railway Street, on the west by Fifth Street and on the north by the northern corporate limits generally flows towards, in the Defiance City Park, where it pools before being directed southerly through an underground system of drains and conduits towards the railroad right-of-way and its outlet into Defiance Creek. Historically, the Defiance City Park area has remained too wet to ever develop because of inadequate drainage.

Defiance is bounded on its southeastern and southern boundaries by the Burlington Northern and Sante Fe Railroad right-of-way. The right of way and track are elevated 30' to 40' above the normal grade of the adjacent areas at its intersection with Old Highway 59 at the southern corporation limit of the City. The railroad right-of-way creates a barrier to the historic drainage patterns of the City. A drainage ditch was located along the northern railroad right-of-way from approximately Third Street to its outlet in Defiance Creek to provide for this historic drainage.

**Problem**

Several residential structures north of Seventh Avenue have been flooded during recent heavy rains because the Defiance storm water systems have become inadequate through the central portion of the City. Further damage in this area will only get worse if this condition is allowed to continue.

Drainage away from the City has been compromised in recent years because the main stormwater drainage ditch located along the railroad right-of-way is congested with an overgrowth of vegetation and trees. This has significantly reduced the flow capacities of the ditch.

Because of the reduced capacity of the ditch, the underpass located at the intersection of Old Highway 59 and the railroad track acts as a catch basin during rain events and fills with several feet of water for extended periods of time. Flooding at this intersection blocks access to the community from the south and endangers local traffic through the area.

Flooding at this intersection also threatens the City's main sanitary sewer system lift station located near the intersection. This lift station was replaced by the City in 1999 as a result of flooding and is now in danger of once again being flooded because the declining capacity of the ditch.

## **Proposed Solution**

The City has previously completed drainage work through the City Park area bounded on the south by Fourth Avenue, on the east by Second Street, on the west by Fourth Street and on the north by Seventh Avenue. A series of 8" drain tile was installed throughout the park to drain this basin through an existing underground system of storm sewers located in Third Street. Since this system was installed in 2002, the Park can now be used and has become a vibrant part of the Community.

To alleviate the potential of residential flooding north of Seventh Avenue the storm water systems need to be improved to allow a greater volume of flow to the City Park area. The City proposes the construction of an underground storm sewers collection system along the right-of way of First Street from Seventh to Eighth Avenue, Second Street from Seventh to Eighth Avenue, and Third Street from Seventh to Ninth Avenue. The storm sewer pipes would be attached to a series of inlet structures located within the right-of-way surface swale located along each street. The system would be connected at a central location along Seventh Avenue and would be directed to the south through the park

To alleviate the problem in the southern portion of the community, the City proposes the construction of an underground storm sewer pipe along the northern railroad right-of-way. The drainage ditch would be filled in. The entire area would be cleared of vegetation. The surface area above the new pipe would be regraded and planted with erosion control surface vegetation. Inlet structures would be placed strategically along the storm drain and at the railroad underpass. The new storm drain would be connected to an existing 48" RCP storm pipe that lies under Old Highway 59. An outlet structure and rip-rap would be installed at Defiance Creek.

## **Action**

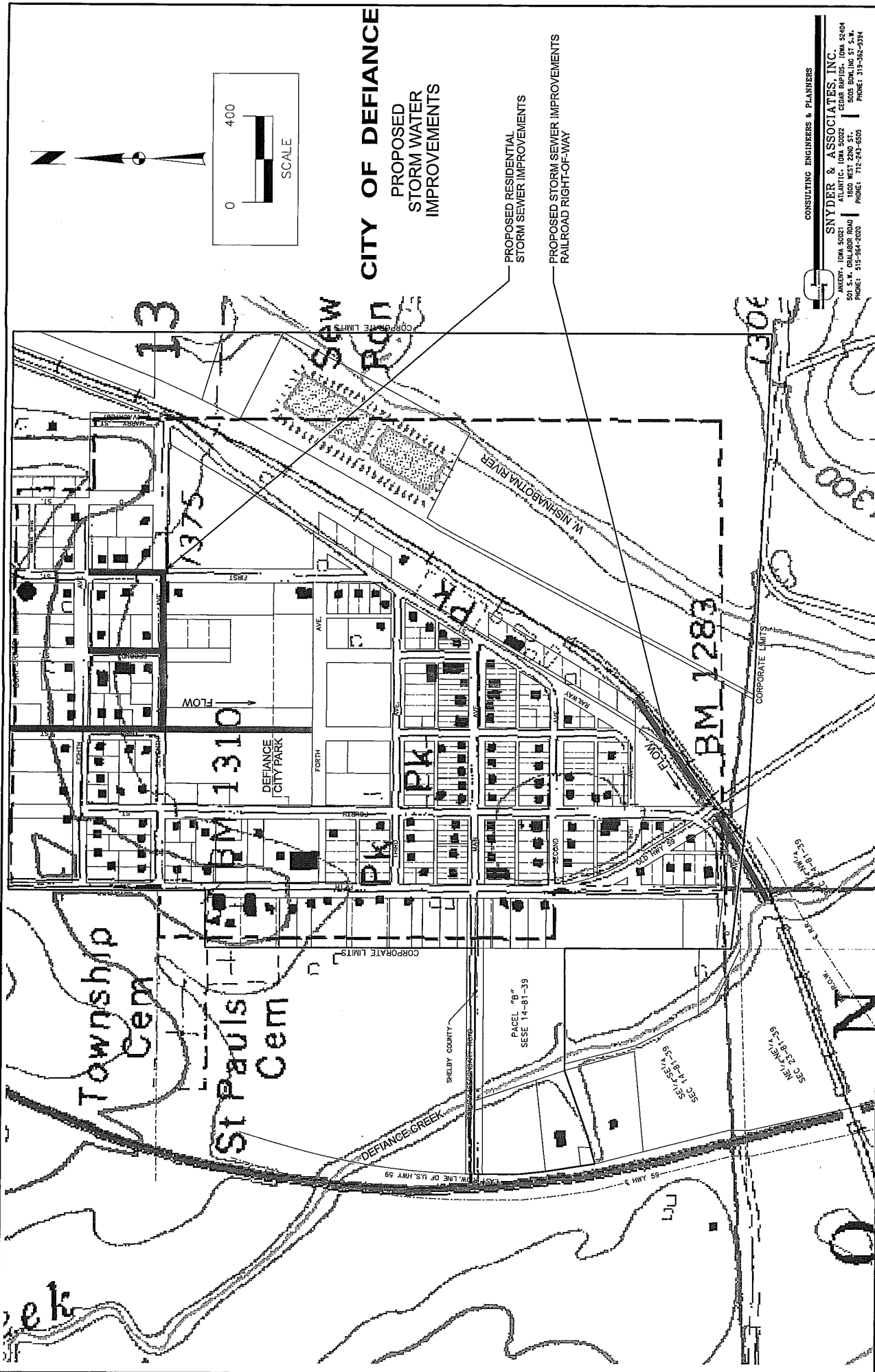
Prior to the completion of any proposed improvement, a city-wide stormwater analysis would be performed to assure proper sizing of piping and structures, and to provide the most feasible solution to the current problem.

A survey of existing utilities, grades and topographic features would be completed to assure proper flow and to provide system routing that would avoid existing utilities.

Based on a preliminary review of the situation and engineering assumptions a preliminary cost estimate of the proposed work is provided below.

**Preliminary Opinion of Probable Cost**

<u>Description</u>	<u>Quantity</u>	<u>Extension</u>
Mobilization	1 LS	\$ 10,000.00
Clearing and Grubbing	1 LS	25,000.00
15" HDPE Storm Pipe	1,300 LF @ \$30/LF	39,000.00
18" HDPE Storm Pipe	700 LF @ \$35/LF	24,500.00
24" HDPE Storm Pipe	800 LF @ \$40/LF	32,000.00
48" RCP Storm Pipe	1,150 LF @ \$75/LF	86,250.00
Area Intakes	11 EA @ \$1,000	11,000.00
Inlet Structures	3 EA	6,000.00
Outlet Structure	1 EA	<u>4,000.00</u>
Construction Total		\$237,750.00
Contingency @ 10%		24,250.00
Legal, Administration, Engineering @ 20%		<u>48,000.00</u>
<b>TOTAL PROJECT COSTS</b>		<b>\$310,000.00</b>



**CITY OF DEFIANCE**  
**PROPOSED**  
**STORM WATER**  
**IMPROVEMENTS**

PROPOSED RESIDENTIAL  
 STORM SEWER IMPROVEMENTS

PROPOSED STORM SEWER IMPROVEMENTS  
 RAILROAD RIGHT-OF-WAY

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